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ABSTRACT

This booklet, one of a series developed by the Frederick County Board of Education, Frederick, Maryland, provides an instruction module for an individualized or flexible approach to 7th, 8th, and 9th grade science teaching. Subjects and activities in this series of booklets are designed to supplement a basic curriculum or to form a total curriculum, and relate to practical process oriented science instruction rather than theory or module building. Included in each booklet is a student section with an introduction, performance objectives, and science activities which can be performed individually or as a class, and a teacher section containing notes on the science activities, resource lists, and references. This booklet introduces students to a study of human health, the human cardiovascular system, and its diseases. The estimated time for completing the activities in this module is two weeks. (SL)

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AIDS TO INDIVIDUALIZE THE TEACHING OF SCIENCE

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MINI-COURSE UNITS

BOARD OF EDUCATION OF FREDERICK COUNTY

1973

ED130900

Frederick County Board of Education

Mini Courses for
Life, Earth, and Physical Sciences
Grades 7, 8, and 9

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1973

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FOREWORD

The contents represented in these modules of instruction, called mini courses, is an indication of our sincere desire to provide a more individualized and flexible approach to the teaching of science.

Data was accumulated during the school year relative to topics in life, earth, and physical science that were felt to be of greatest benefit to students. The final selection of topics for the development of these courses during the workshop was made from this information.

It is my hope that these short courses will be a vital aid in providing a more interesting and relevant science program for all middle and junior high school students.

Dr. Alfred Thackston, Jr.
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HOW'S YOUR PLUMBING

Prepared by

Paul Cook

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HOW'S YOUR PLUMBING

INTRODUCTION:

Among high school students and young adults, accidents cause the most fatalities. But after 45, cardiovascular diseases, which affect the heart and blood vessels, are responsible for more than half the deaths each year in the United States. Approximately 22 million persons are affected by this group of diseases, according to the U.S. Public Health Service. So, is it any wonder that you, either directly or indirectly, will sooner or later be affected by a heart or circulatory disease?

GENERAL OBJECTIVES: (to be realized at the conclusion of the unit)

1. The student should be able to identify the leading cause of mortality from a list of causes of death.
2. The student should be able to explain the symptoms involved in the most frequent types of heart and circulatory diseases.
3. The student should demonstrate support for research in the field of heart disease remedies.

BEHAVIORAL OBJECTIVES:

1. The student will evaluate the widespread frequency of heart disease.
2. The student will determine the frequency of heart disease in men and women and explain the significance of information obtained.

A. Activities

1. The student will survey the number of deaths due to heart disease for one year in Frederick County and compare this information with national statistics available.

Directions: Go or phone 662-1101 at Health Department in Winchester Hall, East Church Street, Frederick, and request the necessary information. Your local life insurance agent or the Almanac should be a likely source for the nation-wide statistics.

B. Activities

2. The student will determine the significance of the sex of the individual in the frequency of heart attacks.

Directions: Obtain this information also from the Health Department of Frederick County.

C. Questions

1. Does the information received confirm the fact that heart disease is the nation's number one killer?
2. Determine the percent of deaths from heart disease, locally and nationally. How does Frederick County compare? Explain your answer.
3. Which sex has a greater number of deaths due to heart attacks?
4. What reasons can you give as to why one sex suffers more from heart attacks?

Optional for extra credit:

1. a. Write a report on the possible affects of cholesterol and heart attacks.
b. In regard to 1a, which part of the egg is involved in the statement: "An egg a day will put your husband away", and why?
2. Write a report on the influence of the androgen and estrogen sex hormones in the aging process of the blood vessels.

BEHAVIORAL OBJECTIVE:

1. The student will demonstrate a knowledge of the structure and function of the circulatory system and its implications in heart and circulatory diseases.

A. Activities

1. Construct a cross-sectional sketch of the three kinds of blood vessels - artery, vein, and capillary.
2. Construct a longitudinal sketch of a vein and identify the valves.
3. Describe the function of the following blood cells: red, white, and platelets.
4. Construct a sketch of the heart, and identify the following parts: left ventricle, right ventricle, left auricle (atrium), right auricle (atrium), valves (between the auricles and ventricles), valves (in aorta and pulmonary artery), aorta, pulmonary artery, pulmonary vein, superior and inferior venae cavae.
5. Observe the circulation of blood in the tail of a goldfish or tadpole.
6. Using a stethoscope, describe the sound of the heart.

Directions:

1. For activities 1 through 4, use the reference materials indicated at the end of this unit.
2. For activity #5, do the following:
 - a. The tadpole or goldfish provided by the teacher should have its gills wrapped in moist cotton. The cotton should not be too bulky as to prevent the animal from fitting easily underneath the lens of a microscope. (The teacher will show you how.)

- b. Place the tadpole or goldfish on a clean petri dish (bottom only) so that the tail lies flat in a drop of water.
- c. Focus in on the blood circulating with only the low power magnification of the microscope.
- d. Note the pulsating of the blood. Are any of the blood cells going in opposite directions? Are any of the blood cells passing through vessels in single file?

B. Questions

1. According to the structure of the three kinds of blood vessels, which one would most easily break from increased blood pressure?
2. What is the purpose of the valves in the veins?
3. The lining of the vessels is extremely smooth and friction-free. The platelets can begin the clotting process if they are broken apart. What could happen to the platelets if the lining of the vessels were roughened by deposits of cholesterol?
4. Describe the following disorders of the heart, blood, and blood vessels by listing the cause (if known), effect, symptoms and treatment:

a. congenital heart defects	g. varicose veins
b. arteriosclerosis	h. phlebitis
c. atherosclerosis	i. stroke
d. coronary heart disease	j. leukemia
e. hypertension	k. anemia
f. rheumatic heart disease	l. lemphilia
	m. murmur
5. Name several factors that increase the chances of developing atherosclerosis or arteriosclerosis.
6. Atherosclerosis or arteriosclerosis has not always been a frequent cause of death. List several reasons why it is so common today.
7. Describe how digitalis is used as a medicine in treating heart disease.
8. Describe how nitroglycerine is used as a medicine in treating heart disease.

Optional for extra credit:

1. Describe the sequence of events in the clotting of the blood.
2. Describe the symptoms of angina pectoris.
3. Describe how a pacemaker is used as a device for treating heart disease.
4. Describe how the heart heals itself following a coronary thrombosis.
5. Observe the values of the veins by squeezing the circulation off in the upper arm.

BEHAVIORAL OBJECTIVE:

1. The student will determine the importance of healthful living in promoting a healthy circulatory system.

A. Activities

1. The student will prepare a mobile, poster, or bulletin board about the importance of diet and exercise in maintaining a healthy circulatory system. The diet should include one week's menu.
2. Demonstrate the importance of physical fitness by setting up an experiment showing how long it takes for the heartbeat to return to normal following exercise.
3. Given a series of various solutions applied to the tail of a goldfish or tadpole, identify those which speed up and slow down the heartbeat.

Directions:

1. For activity #1, check with your family doctor or some adult you may know who has a menu and/or suggested exercises for heart patients. The menu may include foods low in salt and cholesterol. Also, do some reading on aerobics, jogging, and bicycling, and the influence of these exercises on reducing weight, "flushing" the bloodstream of cholesterol, and maintaining strong muscle tone for aiding in circulating the blood.
2. a. For activity #2, select two groups of students - one group should be very much involved in athletics and the other group not involved.
b. Establish the type of exercise to be done - it may be knee bends for one minute, step up and down on a chair for one minute, or running for a certain distance prescribed by your teacher.
c. Determine the normal heartbeat by counting the pulse for 15 seconds and multiplying by four. Do this 3 times and obtain an average, and then a group average. This should be done while at rest by both groups. If it is difficult to find the pulse on the wrist, place your 3 middle fingers to the side of your voice box at the throat; the pulse is easily felt here.
d. After the normal pulse rate has been established, do the prescribed exercise for 1 minute, and take the pulse again. After rest, do two more times and figure averages.
3. You should work in pairs for this activity, so that you have help in keeping track of the time or in counting the pulse.

4. The following chart may be used for recording the information:

Groups of Students	Pulse rate per minute							
	At rest				After exercise			
Physically Fit	Trial 1	Trial 2	Trial 3	Aver.	Trial 1	Trial 2	Trial 3	Aver.
1.								
2.								
3.								
4.								
Group Average	////	////	////					
Physically Unfit								
1.								
2.								
3.								
Group Average	////	////	////		////	////	////	

5. You should decide as a class whether you wish to separate the results of the boys and girls, or put the results together as one.
6. a. For activity 6, first determine the general speed of the flow of blood in the goldfish or tadpole. Set up this activity the same way as you did for Activity 5 on page 2 of the Student Section.
- b. Obtain from your teacher one of the solutions to be used, and put one drop on the tail. Focus in on the circulating blood and determine whether the blood flow has increased or decreased.
- c. In using the rest of the solutions, you must either wait until the following day to continue or obtain a new fish or tadpole. Why is this important?
- d. In using a new solution, whether with a new fish or tadpole or the same one, always determine the normal rate of blood flow.

- e. Use the following chart for recording information and place a (✓) underneath the proper place:

Kind of Solution	Blood Flow				
	Normal		After Adding Solution		
	Fast	Slow	Fast	Slow	No Change
Alcohol					
etc.					

B. Questions

- What effect does each of the following have on the body of heart patients?
 - salt
 - cholesterol
- What benefits are received by the body by maintaining good physical fitness - especially benefits to the heart and circulatory system?
- What effect does each of the following drugs have on the circulatory system?
 - nicotine
 - alcohol
 - coffee or tea containing caffeine
- Why would cigarettes be especially dangerous to a patient suffering from angina pectoris?
- Why is an alcoholic drink sometimes recommended in small quantities to a patient suffering from angina pectoris?

Audio-Visual Aids:

F567 Heart, Lungs, and Circulation, 11 min., color - IMC.

Hemo the Magnificent, 55 min., color - Bell Telephone Company

River of Life, 20 min., color - Local Chapter of the American Red Cross

Heart Association
East Patrick Street
Frederick, Maryland

Many pamphlets, charts, models, and films are available.

Teaching Hints:

1. May use the microprojector for Activity 5 on page 2 of the Student Section.
2. Explain the meaning of cross section and longitudinal section.
3. Provide cotton swabs and alcohol for cleaning the ear plugs of the stethoscope between use.
4. For activity 6 on page 2 of the Student Section, if there is a student with a heart murmur and he consents without embarrassment, it is quite interesting to compare a leaking heart valve with a completely normal one.

Materials:

Solutions for Activity 5 on page 2 of the Student Section:

1. Dilute alcohol (2%): 2 ml of ethyl alcohol to 98 ml of water.
2. Adrenalin (10,000 to 1) purchased or one drop to 700 ml of water.
3. Acetylcholine: same as adrenalin.
4. Nicotine: soak a non-filter cigarette in 10 ml of water for one hour. Filter before using.

References:

Fundamental Concepts of Modern Biology - Chapter 14
S. Haskel - D. Sygoda
Amsco School Publications, Inc., 1972

Investigating Your Health - Chapter 17
Miller, Rosenberg, Stockowski
Houghton Mifflin Company, 1971

Modern Health - Chapter 30

Otto, Julian, Tether

Holt, Rinehart & Winston, Inc., 1971

Healthful Living in Your Environment - Chapter 5

Neilson, Bland, Hill

Laidlaw Brothers, Publ., 1972

World Book Encyclopedias

Field Enterprises Educational Corp.

Evaluation Form for Teachers

1. Name of the mini course _____
2. Was this unit appropriate to the level of your students?
3. Explain how this mini course was used with your students. (Individual, small group, or total class)
4. Identify the plus factors for this course.
5. List the changes that you would recommend for improvement.
7. Did you use any other valuable resources in teaching this unit? If so, please list.

PLEASE RETURN TO SCIENCE SUPERVISOR'S OFFICE AS SOON AS YOU COMPLETE THE COURSE.

ADDITIONAL SCIENCE MINI-COURSES

LIFE SCIENCE

Prepared by

A Study for the Birds	Terrence Best
Creepy Critters (Snakes).	Terrence Best
How's Your Plumbing?	Paul Cook
Guess Who's Been Here for Dinner.	Paul Cook
Plants - The "Other" Living Things.	Sharon Sheffield
Let's Look at You - The Human Organism	Sharon Sheffield
Classification: Why is There a Need?	Melvin Whitfield
Protist: The "Unseen" Kingdom	Melvin Whitfield

EARTH SCIENCE

Coastline Development	Nelson Ford
Ocean Currents	John Fradiska
Features of the Ocean Floor (Ocean Floor Topography).	John Fradiska
Space and Its Problems.	John Geist
Invertebrate Fossils: Clues to the Distant Past	John Geist
An Attempt towards Independent Study in Astronomy	John Geist

PHYSICAL SCIENCE

Household Chemistry	Ross Foltz
Notions on Motions	Kenneth Howard
Environmental Chemistry	Fred Meyers